

What is claimed is:

1. A system for lapping a surface, the system comprising:
a robotic arm; and
a pneumatic end effector unit.
- 5 2. The system of Claim 1, wherein the pneumatic end effector unit comprises:
a first member coupled to the robotic arm;
an abrasive member adapted to engage the surface; and
a flexible coupling member coupled between the first member and the abrasive member.
- 10 3. The system of Claim 1, wherein the pneumatic end effector unit comprises:
a first base attached to the robotic arm;
a second base;
a lapping pad attachable to the second base; and
a pneumatic piston system coupled between the first and second bases.
- 15 4. The system of Claim 3, further comprising:
an abrasive pad; and
a pitch for attaching the abrasive pad to the lapping pad.
5. The system of Claim 3, wherein the pneumatic piston system comprises:
a piston chamber;
20 a piston being slideably received within the piston chamber; and
a component for controlling air pressure within the piston chamber.
6. The system of Claim 5, wherein the piston chamber is configured to guide the second base.
7. The system of Claim 3, further comprising a bumper coupled to the lapping pad.
- 25 8. The system of Claim 3, wherein the second base comprises a latch for attaching the lapping pad to the second base.

9. The system of Claim 3, further comprising a slurry system coupled to one of the second base or the lapping pad for introducing a slurry compound.

5 10. A lapping end effector, comprising:
a first base attached to the robotic arm;
a second base;
a lapping pad attachable to the second base; and
a pneumatic piston system coupled between the first and second bases.

11. The end effector of Claim 10, further comprising:
a flexible coupling member coupled between the first base and the second base.

10 12. The end effector of Claim 10, further comprising:
an abrasive pad; and
a pitch for attaching the abrasive pad to the lapping pad.

13. The end effector of Claim 10, wherein the pneumatic piston system comprises:
15 a piston chamber;
a piston being slideably received within the piston chamber; and
a component for controlling air pressure within the piston chamber.

14. The end effector of Claim 13, wherein the piston chamber is configured to guide the second base.

20 15. The end effector of Claim 10, further comprising a bumper coupled to the lapping pad.

16. The end effector of Claim 10, wherein the second base comprises a latch for attaching the lapping pad to the second base.

17. The end effector of Claim 10, further comprising a slurry system coupled to one of the second base or the lapping pad for introducing a slurry compound.

25 18. A method for lapping a surface, the method comprising:
moveably applying an abrasive member to the surface; and

pneumatically controlling a pressure applied by the abrasive member to the surface.

19. The method of Claim 18, wherein moveably applying an abrasive member to the surface includes flexing a flexible coupling member such that the abrasive member at least
5 partially conforms to the surface.

20. The method of Claim 18, wherein moveably applying an abrasive member to the surface includes flexing a semi-rigid coupling member such that the abrasive member at least partially conforms to the surface.

21. The method of Claim 18, wherein moveably applying an abrasive member to the
10 surface includes flexing a flexible, substantially cylindrical coupling member disposed between a support member and the abrasive member.

22. The method of Claim 18, wherein moveably applying an abrasive member to the surface includes rotatably applying an abrasive member to the surface using a robotic arm.

23. The method of Claim 18, wherein pneumatically controlling a pressure applied by
15 the abrasive member to the surface includes controlling a pressure within a cylinder operatively coupled between a support member and the abrasive member.

24. The method of Claim 18, wherein pneumatically controlling a pressure applied by the abrasive member to the surface includes controlling a pressure using an air logic controller.

20 25. The method of Claim 18, wherein pneumatically controlling a pressure applied by the abrasive member to the surface includes maintaining a constant pressure applied by the abrasive member.

26. The method of Claim 18, further comprising applying an abrasive slurry to the surface at least proximate the abrasive member.